DIVISION 11
WORK ZONE TRAFFIC CONTROL

SECTION 1101
WORK ZONE TRAFFIC CONTROL GENERAL REQUIREMENTS

1101-2 TEMPORARY TRAFFIC CONTROL PLAN (TTC)

It is the Department's responsibility to ensure that proper traffic control is implemented on the project through work zone traffic control reviews.

(A) GENERAL

Any time traffic control signs and devices are placed and/or revised, the Engineer should perform and document a daytime and nighttime work zone review. During this review, particular attention should be placed on ensuring that the work zone is clearly delineated.

(B) PHASING

It is the intent of traffic control phasing to allow the Contractor as much freedom to work as possible, subject to any contract time restrictions, physical construction sequence requirements, and traffic handling and safety. When the traffic control plans are presented for the final design field inspection, or for a traffic control plan review meeting, the Engineer should review them thoroughly for clarity and any construction-related problems. If the Engineer should notice phasing which is too restrictive or which makes construction unnecessarily difficult or impossible, the Traffic Control Project Engineer or Project Design Engineer should be notified. The Engineer should take into account the fact that traffic operations and traffic volumes often place constraints on how traffic can be maintained. Such feedback from field personnel will result in a better understanding of actual field operations and perhaps more effective traffic control plan preparation in the future.

Around the time of the final design field inspection, the Work Zone Traffic Control Unit may hold an internal constructability review meeting with Division Construction personnel, the Area Traffic Engineer, the Division Traffic Engineer, and the Roadway Construction Engineer. The meeting is to review the staging concept for constructability problems and to look at traffic operations.

(D) ALTERNATE TO TRANSPORTATION MANAGEMENT PLAN (TMP)

The Engineer should contact the Traffic Control Project Engineer or Project Design Engineer for assistance in reviewing Contractor's submittals, or when substantial changes to the Traffic Control Plan are desirable or necessary. Requests from the Contractor for approval of alternate methods of traffic control should be in sufficient detail to fully cover the work to be performed and should include all affected portions of the plans and phasing.

Changes made to the Transportation Management Plan (TMP) should be documented through a plan revision or through concurrence with the appropriate Work Zone Traffic Control Unit personnel.

Changes that affect contract time, an intermediate contract time or compensation to the Contractor (either known or unknown) shall be approved by the Engineer.

Guidelines for proposed changes to the Traffic Management Plan (TMP)

1. If the change is covered by a Roadway Standard Drawing, it is probably okay.
2. If you do not feel comfortable with the proposed change for any reason, call the Traffic Control Project Engineer or Project Design Engineer.
3. If you are unsure or have questions about a proposed change, call the Traffic Control Project Engineer or Project Design Engineer.

1101-3 BLASTING ZONES

See Roadway Standard Drawing No. 1101.06 for signing and additional comments.

1101-4 CONSTRUCTION VEHICLE CROSSINGS

Vehicle crossings include moving a piece of equipment across a road and also hauling material across a road. Roadway Standard 1101.03 sheet 9 of 9 should be used for Interstates and other high volume multilane roadways.

If a haul road is needed, use appropriate signing per Roadway Standard Drawing 1101.05. When reviewing requests for vehicle crossings, the Engineer should consider the effect on traffic, the roadway, and construction operations.

Payment for flaggers used at vehicle crossings not involving a lane closure are incidental in accordance with Article 1150-4.

1101-6 EXCAVATIONS WITHIN TRAVELWAY

Metal plates should only be used on roads with speed limits of 35 mph or less. The larger the hole, the thicker the plate needed to span the hole. The thicker the plate, the more the plate will move when hit, resulting in increased damage to vehicles.

1101-7 HAULING OPERATIONS

Review the Hauling restrictions as shown in the plans.

Maintenance of Travel Way

Periodically sweep roadway debris and mud to make markings more visible and to maintain good stopping distances.

When possible, the number of access points used by the Contractor should be limited. These access points can be changed from day to day but should be signed properly and limited in number.

1101-8 MATERIAL AND EQUIPMENT STORAGE AND PARKING

The Contractor shall be required to locate construction vehicles and equipment and store materials a minimum of 40 feet away from active travel lanes. The Engineer may allow the Contractor to locate closer than 40 feet if it is determined that the existing clear zone is less than 40 feet. In no case shall the Contractor be allowed to locate construction vehicles and equipment and store materials closer to the travel way than the existing clear zone. The Work Zone Traffic Control Unit has referred to AASHTO's (American Association of State Highway and Transportation Officials) *Roadside Design Guide* to help determine the clear zone. If you have any questions, please call the Work Zone Traffic Control Unit.

1101-9 PARKING OF PERSONAL VEHICLES

Vehicles parked near the travel way, especially on freeways and interstates, cause motorist distraction and "rubbernecking." It is up to the Engineer to determine if there is a suitable location within the right-of-way to park personal construction personnel vehicles that will not interfere with traffic or construction operations.

1101-10 PROTECTION OF HAZARDS

In many situations, protection of hazards progresses from the use of channeling devices to the use of positive protection such as temporary guardrail or barriers.

On roadways with posted speed limits of 45 mph or greater, backfill drop-offs, that exceed 2 inches. On roadways with posted speed limits less than 45 mph, backfill drop-offs that exceed 3 inches. Do not exceed a difference of 1½ inches in elevation between open lanes of traffic.

For situations where a minimum lift is 2 inches, special consideration should be taken for traffic control to mitigate the time traffic is exposed to 2 inches difference between lanes.

For those locations that are safety hazards or critical areas, (including traffic switches, etc.,) consideration should be given to illuminating them at night to increase visibility. If portable lighting is not included in the contract, consult the Work Zone Traffic Control Unit to determine if it is necessary.

Drums, cones and skinny drums are preferred over barricades to mark hazards in the travel way, such as raised manhole covers.

1101-11 TEMPORARY LANE CLOSURES

(A) GENERAL

Lane closures on multi-lane freeway-type roadways can be extended up to 1500 feet beyond the maximum length stated in the Traffic Control Plan to allow additional acceleration distance for the Contractor's vehicles to obtain sufficient speed to safely merge with existing traffic. In this situation, a down stream taper does not have to be used. When installing a lane closure on a multilane roadway, install and activate the CMS (Changeable Message Sign) with a message to inform motorists of the upcoming activity. Once the lane closure is installed, be sure to change the CMS as shown in the plans for the future operation. If a TMA (Truck Mounted Attenuator) is included in the contract, utilize the TM~~I~~A for positive protection when installing and removing the lane closure. When removing the lane closure, back the TMA up such that it is protecting the collector's vehicle. If the lane closure is being removed prior to daylight, the headlights of the TMA should be on while the collection vehicle's headlights are off. Another option to remove a lane closure on an Interstate or high volume multilane roadway is using Roadway Standard 1101.02 sheet 9 of 9.

When portable lighting is included in the contract, consideration should be given to illuminating the merge area at night on multi-lane roadways to increase lane closure visibility.

(B) INTERSECTIONS

If possible, use police to direct traffic through large intersections with the signals activated to the flash mode.

1101-12 TEMPORARY ROAD CLOSURES

All efforts should be made to notify the public of road closures by contacting adjacent property owners personally or working with the Communications Office.

Make sure that when Department forces install off-site detour signing, it does not conflict with the signing the Contractor has installed. Once installed, drive the offsite detour and ensure all signage is correct.

This article includes permanent closings and openings as well as reopening of roads.

A meeting between the Engineer and the Contractor should be held prior to switching a traffic pattern or closing a road. Also, the Engineer should notify the US Postal Service, the local school system, and 911 services prior to any traffic pattern changes.

1101-13 TRAFFIC CONTROL SUPERVISION

The Contractor shall provide a Qualified Traffic Control Supervisor for the project. The Traffic Control Supervisor is not required to be on the project sight at all times, but make periodic reviews and must be available to discuss concerns with the Engineer. The Qualification of the Traffic Control Supervisor must be certified by a NCDOT approved training agency or other approve agency.

The Contractor and Department personnel need to be familiar with the documents used to handle traffic and have copies of these documents on site.

OSHA Inspectors are stopping in work zones and making reviews. OSHA Inspectors have the right to interview all employees on site. Make sure that all employees are aware of what documents they are working from.

All changes made to the plans need to be documented in the project diaries.

SECTION 1105
WORK ZONE TRAFFIC CONTROL DEVICES

1105-2 MATERIALS

See Article 106-3 of the *Standard Specifications* for certification requirements. With used traffic control devices, construction personnel should judge whether or not the device will serve the intended purpose before allowing the Contractor to place it on the project.

All traffic control devices have been pre-tested and pre-approved by the Work Zone Traffic Control Unit. Contact the Work Zone Traffic Control Unit if you have any questions or need help with the approved products list.

1105-4 MAINTENANCE AND INSPECTION

The Engineer should establish a regular routine for inspection (day and night) to inspect devices and to perform traffic control surveillance operations. Use a standard form to document each inspection. (See the end of this section for an example). Monitor traffic control devices throughout the project to ensure that they are serving their intended purpose. If a device is no longer adequate for its purpose, have the Contractor replace it.

If you find something during an inspection that you are unsure about or if something is used that you like that is not part of the Traffic Control Plan, call the Work Zone Traffic Control Unit. The Engineer and the Contractor should perform these reviews together.

It is a good idea to discuss the amount of traffic control surveillance necessary at the preconstruction conference. The amount of surveillance needed varies. Generally, the amount of surveillance needed is proportional to the size of the project and the complexity of the traffic control plan, and how recently the traffic pattern has been changed.

Examples of factors that could affect when the project needs to be reviewed include: the weather (storms, windy, etc.,) location of the project, and types of devices (drums, barricades, other devices that get knocked over easily).

It is very important to have a consistent systematic plan for performing traffic control surveillance.

SECTION 1110
WORK ZONE SIGNS

1110-2 MATERIALS

All work zone signs shall have fluorescent orange retro-reflective sheeting, except roll-up signs which shall have fluorescent orange sheeting with the characteristics of sheeting. If you have questions about the levels of reflective sheeting, call the Work Zone Traffic Control Unit.

Use 3 lb. U-channel posts, approved Perforated Square Steel Tubing (PSST) with anchor system or 4 inches x 4 inches wooden post as supports for stationary work zone signs. Dual 3 lb. U-channel or 4" x 4" wooden posts are required when a sign is larger than 10 square feet. A single approved PSST with anchor system can hold up to 20 square feet with a single post. Contact the Work Zone Traffic Control Unit for the approved PSST and anchoring system.

1110-3 CONSTRUCTION METHODS

The "ROAD WORK AHEAD" sign (W20-1) shall be the first sign viewed by traffic except when a Changeable Message Sign is required on the project. When locating the "ROAD WORK AHEAD" sign (W20-1) and if it is not shown in the plans, it may be helpful to calculate the location of the first sign for a typical left or right lane closure at the beginning of the work zone. Place the "ROAD WORK AHEAD" sign (W20-1) a distance "B" from the first sign of the lane closure. See the chart for distance "B" in Roadway Standard Drawing No. 1101.11 sheet 4 of 4. This will assure that the "ROAD WORK AHEAD" sign (W20-1) will not have to be covered or relocated when a lane closure is installed beyond the project limits. Install advance work zone warning signs when work is within 10 feet from the edge of the travel lane but not more than 3 days prior to beginning work.

When applicable, cover the advance work zone warning signs with an opaque material such that the sign sheeting is not damaged. Some options are as follows:

- One layer of burlap is not an acceptable method for covering work zone signs. Two or three layers of burlap or silt/erosion control fence is an acceptable method of covering work zone signs. If using burlap, drive by the sign (preferably at night) to make sure the sign cannot be seen.
- Silt Fence may be used to cover temporary work zone signs for short durations if sufficient air holes are punched in the plastic. Make sure the silt fence is clean and the sign cannot be seen at night.

Signs do not have distances listed on the front (i.e., ROAD CONSTRUCTION 500 FEET) which allows more flexibility in adjusting the signs to meet field conditions.

Caution should be used when adjusting the location of signs which contain distances (i.e., ROAD CLOSED 500 FEET.). If the "ROAD CLOSED 500 FEET" sign is moved to 700 feet prior to the work zone and an accident happens, the Department could be held responsible.

Detour signing is comprised of route and guide signs. These signs are discussed in part II of the *Manual on Uniform Traffic Control Devices (MUTCD)*. Detour signing may also include warning signs (Part II in *MUTCD*) and construction signs (Part VI of *MUTCD*)

The Engineer should be aware of other construction/utility operations in or near the work zone. Coordinate these operations to avoid overlapping signing.

Prior to the installation of stationary work zone signs, the Contractor shall designate the locations of the signs and get the Engineer's approval. Once approved by the Engineer, the Contractor may install the signs. It is still the Contractor's responsibility to locate all underground utilities. If the Engineer does not approve the location of a sign, it is the responsibility of the Engineer to designate the location for the sign to be installed.

Use only approved roll-up or composite material for portable signs.

Do not install signs more than 3 days before construction is to take place. When no work is being conducted for a period longer than one week, remove or cover all advanced work zone signs.

SECTION 1115
FLASHING ARROW BOARDS

1115-1 DESCRIPTION

Refer to Roadway Standard Drawing No. 1115.01 for modes of operation of the flashing arrow board in lane closure situations.

1115-2 MATERIALS

If the Contractor brings a flashing arrow board to the project, check the website: https://apps.dot.state.nc.us/vendor/approvedproducts. If the flashing arrow board is not on the approved list, contact the Work Zone Traffic Control Unit.

1115-3 CONSTRUCTION METHODS

Refer to Roadway Standard Drawing No. 1115.01 for board types and operating requirements. While most boards are equipped with an automatic photoelectric dimmer, frequent night reviews should be made to ensure that the panel is properly dimmed.

As described in the Roadway Standard Drawing No. 1115.01:

1. Type A boards are not allowed in construction project work zones.
2. Type B boards may be used in low-speed construction project work zones.
3. Type C boards are the preferred arrow boards for construction project work zones.

Sequential arrow displays, left or right sequential chevrons, and straight line caution mode displays **are not allowed**.

A four-corner flash mode for caution is required. Make sure that each arrow board has this capability.

SECTION 1120
PORTABLE CHANGEABLE MESSAGE SIGNS

1120-1 DESCRIPTION

The Department has a policy for the use of changeable message signs (a copy of the policy is shown at the end of this section). The Division Engineer has a copy of this policy and is ultimately responsible for the messages used on the Changeable Message Signs.

Messages on the Changeable Message Sign should be changed at least weekly to maintain driver interest. If you are having trouble coming up with different messages, contact the Work Zone Traffic Control Unit. If the messages are not being changed, consider using a stationary sign.

The message signs are equipped with event time clock programs which allow messages to be programmed and then displayed at set times.

1120-2 MATERIALS

If the Contractor brings a changeable message sign to the project, check the website: https://apps.dot.state.nc.us/vendor/approvedproducts. If the CMS is not on the approved list, contact the Work Zone Traffic Control Unit.

1120-3 CONSTRUCTION METHODS

The Portable Changeable Message Sign should be inspected to insure proper alignment. These signs can create a glare problem. Therefore, the sign should not be placed perpendicular to the lane of travel but rather rotated horizontally slightly. Also, the flash rate should be adjusted so that no more than two messages are legibly displayed to motorists traveling at the posted speed limit. Where these signs are placed on paved shoulders, close the shoulder using cones or drums per Roadway Standard Drawing No. 1101.04. If the device is away from the paved shoulder, delineate the sign with drums.

The operator shall be capable of changing preprogrammed messages, inputting new messages and troubleshooting as needed or as directed by the Engineer. This operator shall be available at all times while construction is taking place on the project. Periodic drive-by inspections should be made to ensure that the correct message is displayed pertaining to current operations. If the changeable message sign is Contractor furnished, it is the Contractor's responsibility to operate the changeable message sign. However, the Department should be able to operate the sign in emergency situations. The Changeable Message Sign should not be placed in service without an experienced operator.

The operational manual shall be provided with the sign. Review the operation of the sign, test the operator's ability to use the machine, and make sure the operation manual is available.

Message information should relate to current highway conditions that require driver reaction. Refer to the Department's "Policy for the Use of Changeable Message Signs" for additional guidelines.

No more than two messages should be used per CMS. If more than two messages are needed, consider using an additional CMS.

1120-4 MEASUREMENT AND PAYMENT

Changeable Message Signs (Short Term) are used for short duration construction activities such as:

- Hanging bridge girders
- Traffic shifts on interstates or other high speed, high volume roads
- Any other activity of **LESS THAN 30 DAYS** that requires a changeable message sign

The intent of this pay item is to have Contractors bid something close to rental rates for a changeable message sign for a short duration activity instead of bidding the price of a brand new changeable message sign or one that is expected to be used and maintained for long durations.

Short term changeable message signs are used in situations where a changeable message sign will be needed for less than 30 days per each specific operation.

SECTION 1130
DRUMS

1130-2 MATERIALS

For drum and reflective sheeting size requirements, refer to Roadway Standard Drawing No. 1130.01.

1130-3 CONSTRUCTION METHODS

Sandbags or other material shall not be placed on top of the drum as they could become a traffic hazard if hit. Only drums that have been engineered for tire ballast should be used with tire ballast. There is only one size tire that is approved for drums designed to use tire ballast. See Roadway Standard Drawing 1130.01 sheet 1 of 1 for approved tire ballast size. Tire ballast needs to be flush with the ground and turned the correct way so it cannot hold water. All drums are approved by the Work Zone Traffic Control Unit and can be found at this website:

https://apps.dot.state.nc.us/vendor/approvedproducts-.

If you have any questions about approved drums, contact the Work Zone Traffic Control Unit.

1130-4 MAINTENANCE

The Contractor is responsible for maintaining the drums in good serviceable condition throughout the life of the project. The Engineer should require the Contractor to immediately clean, repair, or replace any drum whose reflective sheeting becomes dirty, torn, or damaged. Regular nighttime work zone reviews should be performed in order to identify the drums needing maintenance.

SECTION 1135
CONES

1135-2 MATERIALS

For cone and reflective sheeting requirements, refer to Roadway Standard Drawing No. 1135.01. Cones are approved by the Work Zone Traffic Control Unit and can be found at this website:

https://apps.dot.state.nc.us/vendor/approvedproducts

1135-3 CONSTRUCTION METHODS

Cones may be used as channelizing devices. Cones are easily blown over or displaced by the wind created by passing vehicles. Ballasting of the cones is extremely critical in this situation. Ballasting may be accomplished by using weighted cone rings or by double stacking the cones. **Do not alternate cones with drums, skinny drums or any other channelizing devices within a lane closure**. If cones are being used for a lane closure on a multilane roadway, use drums for the taper and cones in the tangent section.

Cones used at night shall have reflective collars. Most winter work ends during dusk/darkness and reflective collars are required.

SECTION 1145
BARRICADES

1145-2 MATERIALS

Refer to Roadway Standard Drawing No. 1145.01 for size and design requirements.

1145-3 CONSTRUCTION METHODS

Where access at a point of road closure is provided for construction equipment through the Type III barricades, the barricade sections may be staggered to allow construction traffic to maneuver through them while the barricades still appear to be a solid line to oncoming traffic. The Contractor is responsible for verifying that the barricades no longer allow access at the end of each day.

Windloading is worse on barricades with signs and additional ballasting may be required. During windy conditions, barricades should be checked more frequently. Sandbags exposed to sunlight are prone to deterioration and should be monitored.

In the placement of the barricades, determine if there is a passable shoulder. If so, make sure barricades extend to that point on the shoulder to cover the passable area. Motorists often will use the shoulder of the road to bypass the closure, especially in areas that are paved.

Barricades should be placed such that the stripes slope downward in the direction that traffic is to pass. For a road closure, the barricade stripes should slope to the center of the roadway when traffic is not passing to one side.

Use only roll-up or approved composite signs placed on the barricade rails to maintain the barricade's crashworthiness.

Barricades are approved by the Work Zone Traffic Control Unit and can be found at this website: https://apps.dot.state.nc.us/vendor/approvedproducts
Contact the Work Zone Traffic Control Unit if you have any questions.

1145-5 MEASUREMENT AND PAYMENT

Remember that payment is made based on the maximum number of linear feet in place at any one time during the life of the project.

No direct payment will be made for ballasting barricades and shifting barricades to allow access for construction vehicles.

SECTION 1150
FLAGGERS

1150-2 MATERIALS

Reflectorized STOP/SLOW paddles and reflectorized vests should be used for all flagging operations. Every flagging operation performed in a construction zone, including moving or unloading equipment, should be done using a STOP/SLOW paddle.

Refer to Roadway Standard Drawing No. 1150.01 for requirements.

1150-3 CONSTRUCTION METHODS

Both sides of the flagging operation should be inspected for sight distance. The flagging zone may need to be altered when curves or hills limit drivers' sight distance. When flaggers cannot hear or see each other, two-way radios should be used. If radios are not available, a pilot vehicle should be used. Pilot vehicles are particularly useful in long work zones, such as resurfacing.

Flagging operations should be conducted in accordance with the guidelines of the Flagger Training Certification class.

The Contractor is required to provided flaggers that have obtain flagger certifications from a NCDOT approved training agency. The Contractor shall also provide a Qualifications Statement to the Engineer stating all flaggers have been properly certified. Flaggers shall demonstrate their flagging techniques and nonverbal communication techniques prior to performing flagging operations.

When flagging through a signalized intersection, the signals should be placed in flash mode.

1150-4 MEASUREMENT AND PAYMENT

Special attention should be placed on the maintenance of the flagger signs. The signs should be replaced quickly if they are blown over and they need to be removed when flagging operations cease. The flagger signs should also be moved accordingly if the work zone moves down the travel way.

Flagging is measured in either days or hours. The Division Construction Engineer and the Resident Engineer should discuss which method of measurement to use with the Traffic Control Unit at the final design field inspection. They should also discuss the amount of flagging days or hours that will be necessary for the project.

Flagging days are easier to administer; however, it is much easier to overrun this pay item using days. Flagging hours are much more accurate, but are harder to track. Flaggers are no longer paid for on operations that do not involve a lane closure.

Flaggers that are used to direct traffic on -Y- lines while work is being performed on the -L- line will be paid.

SECTION 1160
TEMPORARY CRASH CUSHIONS

1160-2 MATERIALS

Any used crash cushions should be inspected prior to use. These used crash cushions should come with all attachment items for asphalt and concrete.

All temporary crash cushions are required to have a yellow reflective end treatment. See Roadway Standard Drawing 1160.01 sheet 1 of 1 for end treatment details.

Prior to installing a new or used temporary crash cushion, the Contractor should furnish the manufacturer's drawing and Specifications to the Engineer. The Engineer should use this information to inspect installation and verify that it was done correctly.

When sliding guardrail crash cushions are used, the transition panel should be attached to the barrier on the side adjacent to traffic. If there is traffic on both sides of the barrier, the transition panels shall be attached to both sides of the barrier.

If a crash cushion is placed on a concrete pad, make sure the top of the concrete pad is at the same elevation as the surrounding ground. If a crash cushion is anchored to asphalt, ensure the existing asphalt thickness meets the manufacturer's requirements. If you have any questions about the use of crash cushions, contact the work Zone Traffic Control Unit.

1160-3 CONSTRUCTION METHODS

Temporary crash cushions are tested under controlled conditions, such as on flat tangent sections. It is imperative that temporary crash cushions be installed according to manufacturer's Specifications. **NO EXCEPTIONS!** This will ensure that the manufacturer stands behind the product in the case of an accident.

After the location for the crash cushion has been determined, check the existing terrain to see if any advanced grading is needed. The approach terrain should be as level as possible. Uneven surfaces or obstructions such as dips, ditches, or curb and gutter located in front of the temporary crash cushion can create a ramping effect, thus reducing its effectiveness. An important feature requiring special attention is the anchoring system for the temporary crash cushion. Placing some crash cushions directly on soil requires the purchase of an additional anchoring system. It is imperative that if crash cushions are to be anchored directly to soil the Engineer must verify that the proper anchoring system is used.

Contact the manufacturer or Work Zone Traffic Control Unit for more information.

Damaged units or parts shall be removed from the project immediately to eliminate additional hazards.

Crash cushions that use a hex foam cartridge should be inspected periodically to make sure the cartridges have not deteriorated.

Adequate means of protection while replacing a temporary crash cushion include the use of a Truck Mounted Attenuator or adjusting the length of the barrier to provide an adequate taper.

1160-4 MEASUREMENT AND PAYMENT

No payment will be made for repairing or replacing a damaged crash cushion.

SECTION 1165
TRUCK MOUNTED ATTENUATORS

1165-2 MATERIALS

Refer to Roadway Standard Drawing No. 1165.01 for requirements. TMA's are approved by the Work Zone Traffic Control Unit and can be found at this website: https://apps.dot.state.nc.us/vendor/approvedproducts

1165-3 CONSTRUCTION METHODS

If the truck used for the Truck Mounted Attenuator (TMA) does not meet the minimum weight requirements, there are three approved methods to increase the truck weight:

1. Sections of barrier strapped to the truck bed in a manner acceptable to the Engineer.
2. Poured in place concrete anchored in the truck bed.
3. Poured in place asphalt anchored in the truck bed.

TMAs should be moved to where workers are performing work. TMAs used in moving operations should have a "SLOW MOVING VEHICLE" sign on the back.

TMAs used in non-moving operations should be placed with an adequate roll ahead distance. The Contractor should follow the manufacturer's directions for the appropriate roll ahead distance. Adequate truck weight and locked brakes are important factors in obtaining the proper roll-ahead distance.

The truck part of the TMA must be operational.

The Contractor should follow all of the manufacturer's Specifications.

If an adequate buffer space is available, then a TMA is not required, but it is still desirable.

Contact the Work Zone Traffic Control Unit for questions regarding TMAs.

1165-5 MEASUREMENT AND PAYMENT

No payment will be made for the repair of a TMA.

SECTION 1170
POSITIVE PROTECTION

1170-3 CONSTRUCTION METHODS

Barrier should be connected in accordance with the manufacturer's requirements. A regular drum lane closure should be used in advance of a barrier taper to close a roadway shoulder or a travel lane. The minimum tangent length for the drum lane closure should be 300 feet. The drums should be placed to the taper/tangent point of the barrier to direct traffic away from this kink in the barrier (See Roadway Standard Drawing No. 1101.02, Sheet 8 of 9).

Barrier should not be placed on slopes steeper than 6:1. Barrier shall be placed on a stable surface.

If the field conditions allow, a 2-foot flare on the approach end of the barrier should be installed in areas where the plans show the barrier parallel to the travel lane.

The approach end of barrier may be buried in a cut or fill slope. Contact the Work Zone Traffic Control Unit if you desire to use this option.

Anchor portable concrete barrier in accordance with the Roadway Standard Drawing No. 1170.01, Sheet 4 of 4. Ensure the thickness of existing asphalt meets the requirements of the Roadway Standard Drawing.

Anchored barrier should not be used on soil. If the plans specify anchored barrier on soil, a special detail is required.

The through-the-deck anchoring methods cannot be used on new bridge decks with prestressed concrete deck panels, cored slabs or boxed beam bridges.

Drainage barrier is put in as a general quantity and should be used as needed.

Drainage barrier can be used anywhere on the project in lieu of regular portable barrier.

Five-inch lip barrier must be approved by the FHWA prior to use. Five-inch lip barrier cannot be mixed in with regular three-inch lip barrier, because variable lip heights create snag problems.

1170-4 MEASUREMENT AND PAYMENT

Anchored barrier that is used in an area where anchored barrier is not required will be paid for as regular portable concrete barrier unless otherwise directed by the Engineer.

If barrier CANNOT be moved directly from Installation A to Installation B, then it will be paid for twice under Resetting Portable Concrete Barrier. The first payment will be from Installation A to a stockpile and the second payment will be from the stockpile to Installation B.

The integrity of all used barrier should be verified with a rebound hammer (Swiss Hammer) test as called for in Article 1090-1(B)(2).

SECTION 1180
SKINNY DRUMS

1180-1 DESCRIPTION

For Skinny Drum and reflective sheeting size requirements refer to Roadway Standard Drawing No. 1180.01.

1180-3 CONSTRUCTION METHODS

Do not alternate skinny drums with cones, drums or any other channelizing devices within a lane closure. There are restrictions when using skinny drums on multilane roadways. Please refer to the 2006 Standard Specifications, Section 1180.

TECHNICIAN'S CHECKLIST
SECTION 1100
WORK ZONE TRAFFIC CONTROL

1. Review the traffic control plans. Adapt the traffic control plans to meet field conditions to provide safe and efficient traffic movement.
2. Ensure traffic control devices are on the approved list.
3. Ensure traffic control devices are installed in accordance with the applicable Standard Drawings.
4. Perform Work Zone Traffic Control Audits to ensure traffic control devices are properly installed and maintained.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION POLICY FOR THE USE OF CHANGEABLE MESSAGE SIGNS

I. POLICY STATEMENT

This policy provides specific guidelines for the use of stationary and portable changeable message signs (CMS) used on the North Carolina highway system. Messages displayed shall convey pertinent information to motorists, which assists in their driving decisions. Messages shall be conveyed in a standard, non-confusing manner that allows drivers to both perceive and react to the information given in a timely fashion.

II. PURPOSE

CMS can be used to effectively reduce congestion caused by planned or unplanned incidents such as excessive daily traffic, accidents, detours, construction delays, special events, etc. Once a driver population has gained confidence that messages are reliable and relay pertinent information that assists in reducing delays, CMS can be used to convey information, alter traffic patterns, or modes of transportation.

III. AUTHORIZATION

The Division Engineer will authorize the use of all CMS both state owned and Contractor furnished. Each CMS shall have a person designated by the Division Engineer to be responsible for the authorization of messages to be displayed and for the care, maintenance, and security of the CMS. This person may delegate certain responsibilities in regard to the CMS but should ensure that any personnel given access to the CMS understands and adheres to this policy.

Access to the CMS shall only be given to responsible individuals. The Division Engineer will ensure that efforts are coordinated such that motorists are informed of the most critical information based on the priority of messages listed below.

IV. DISPLAY OF MESSAGES ON STATIONARY CMS

Messages shall be displayed on stationary CMS in accordance with the below listed priorities. When a stationary CMS is not being used to display one of the below listed message types, it shall remain blank.

Types of messages conveyed on stationary CMS have the following priority:

1. Emergencies such as evacuations or closures required by the NCDOT, the Department of Emergency Management, local law enforcement or the military.
2. Hazardous and/or uncommon road conditions which require motorists to alter their driving such as severe weather conditions, accidents, or work zone activities.
3. Traveler information and suggested alternate routes for delays and/or congestion caused by planned or unplanned incidents.
4. Advance notice for scheduled incidents such as lane closures, road closures, or special events.
5. Other public information which assists the Department in improving highway safety and reducing congestion may be displayed after careful consideration. However, the message must require motorists to alter their driving and direct approval by the Division Engineer must be received prior to displaying the message.

CMS shall not display messages that in any way advertise commercial events or entities. CMS shall only display messages, which pertain to highway safety or congestion reduction. CMS shall not be used to convey the same message for an extended period of time. CMS shall not repeat guide sign or warning sign messages.

V. DISPLAY OF MESSAGES ON PORTABLE CMS

Messages shall be displayed on portable CMS in accordance with the below listed priorities. When the portable CMS is no being used to display on of the below listed message types, it shall remain blank.

Types of messages conveyed on portable CMS have the following priority:

1. Emergencies such as evacuations or closures required by the NCDOT, the Department of Emergency Management, local law enforcement, or the military.
2. Hazardous and/or uncommon road conditions which require motorist to alter their driving such as severe weather conditions, accidents, or work zone activities.
3. Short term detours (mandatory) for a partial audience for which no other signing is in place.
4. Traveler information and suggested alternate routes for delays and/or congestion caused by planned or unplanned incidents.
5. Advance notice for scheduled incidents such as lane closures, road closures, or special events.
6. Other public information which assists the Department in improving highway safety and reducing congestion may be displayed after careful consideration. However, the message must require motorist to alter their driving and direct approval by the Division Engineer must be received prior to displaying the message.

CMS shall not display messages that in any way advertise commercial events or entities. CMS shall only display messages, which pertain to highway safety or congestion reduction. CMS should not be used to convey a message for an extended period of time that could be conveyed with a conventional warning sign.

Form R-1

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

WORKSITE AUDIT

Date: _____ Time: _____ AM/PM Auditor Name: _____

Division: _____ Department: _____ County: _____

Worksite Location: _____

In-Travel Lane? _____ Posted Speed Limit: _____

Operation Being Audited: _____

	Rating			Observations/Corrective Actions	Abatement Date
Category	**S**	**U**	**N/A**	S=Satisfactory, U=Unsatisfactory, N/A=Not Applicable	If corrective actions needed
Safety Equipment					
Hard Hat					
Vest					
Shoes					
Hearing Protection					
Eye/Face Protection					
Foot Protection					
Gloves					
Chain Saw Chaps					
Other					
Traffic Control					
Signs					
Work Zone Length					
Flaggers					
Taper					
Cones, Drums					
Arrow Boards					
Attenuator					
Sight Distance					
Other					
Worksite					
Utilities Located/Guarded					
Excavation					
Confined Space					
Housekeeping					
Lockout/Tagout					
Fire Protection					
Hazardous Materials					
Electrical Hazards (GFCI)					
Other					

61-50010 (over)

	Rating			Observations/Corrective Actions	Abatement Date
Category	S	U	N/A	S=Satisfactory, U=Unsatisfactory, N/A=Not Applicable	If corrective actions needed
Tools					
In Safe Condition					
Used Correctly					
Right for Job					
Other					
Equipment					
Back-up Alarms					
Spotter for Backing					
Strobes/Warning Lights					
Seat Belt Use					
Pinch Points					
Other					
Elevated Work					
Ladders					
Lifelines					
Harness/Lanyards					
Scaffolds					
Other					
People					
Positioning					
Lifting Techniques					
Respiratory Hazards					
Skin Irritants					
Other					
Tailgate Safety Meeting					

General Comments:

CC: Supervisor's Supervisor
Audit Review Subcommittee

Revised: July 2002